

## LETTER TO THE EDITOR

### WERE HANTAVIRUSES EVENTUALLY RESPONSIBLE FOR THE LOST ANASAZI CULTURE ?

C. CHASTEL

Laboratoire de Virologie, Faculté de Médecine, F 29285 Brest Cédex, France

*Received September 28, 1998; accepted October 12, 1998*

Native Americans referred to as Anasazi, the Ancient Ones, were cliff dwellers building homes on canyon walls and under rock overhangs in the Four Corners Region of the southwestern USA between 900 and 1300 A.D. These people were the ancestors of modern day Pueblo Indians. The Anasazi farmed on the plains at the foot of their cliff homes or on the flat-topped hills (*mesas*) above their dwellings. They grew corn, beans, squash, cotton, tobacco and raised turkeys. The Anasazi civilisation reached its highest point in about 1300 A.D. but, only a short time thereafter, these people completely abandoned their cliff towns and moved to the south and east. Classical explanations for such an event were attacks by hostile invaders, climatic changes, loss of food supply, wood shortage, severe drought, or a combination of these factors. However, the devastating effect of an emerging infectious disease should be considered too.

During May and June 1993, 42 cases of an apparently new lethal pulmonary disease mimicking plague occurred in a Navajo reservation, the Four Corners Region, very near the ancient settlements of the Anasazi in the southwestern USA. About two-thirds of the infected people died, and a new hantavirus was quickly identified at the CDC, Atlanta, using reverse transcription-polymerase chain reaction (1,2,3). This new viral disease was named "hantavirus pulmonary syndrome" (1), and the virus, whose genome was fully characterised, was designated "Sin Nombre virus" (4). It was also demonstrated by CDC investigators that this virus was carried primarily by deer mice (*Peromyscus maniculatus*). Their present habitat includes Central Mexico,

most of the USA and Canada (5). The infection of humans occurs most likely by aerosol from the rodents urine and faeces (3).

According to the theory of natural foci of rodent-borne diseases, it is not illogical to postulate that the lost Anasazi culture was provoked, at least in part, by an outbreak of the hantavirus pulmonary syndrome. The infection of humans may have occurred by contact with deer mice or other rodents (4) foraging into Indian fields. However, the 1993 outbreak was preceded by unusual heavy rains and snows during the spring, an abundance of food supply for deer mice, and the resulting proliferation of these rodents (4). This was certainly not the case during the 1300s, when a severe drought was supposed to have occurred.

In fact, the only way to prove or refute our "hantavirus hypothesis" would be to detect Sin Nombre virus genome fragments or antigens in the lung tissue of Anasazi mummies.

#### References

1. Hughes JM, Peters CJ, Cohen ML, Mahy BWJ, *Science* **262**, 850-851, 1993.
2. Nichol ST, Spiropoulou CF, Morzunov S, Rollin PE, Ksiazek TG, Feldmann H, Sanchez A, Childs J, Zaki S, Peters CJ, *Science* **262**, 914-916, 1993.
3. Marshall E, *Science* **262**, 832-836, 1993.
4. Chizhikov VE, Spiropoulou F, Morzunov SP, Monroe MC, Peters CJ, Nichol ST, *J. Virol.* **69**, 8132-8136, 1995.
5. Stone R, *Science* **262**, 833, 1993.